17BB306-OPERATIONS RESEARCH

Course Description and Objective:

The objective of the course is to introduce some of the tools that facilitate better understanding about the operations in a quantitative form and help them in taking right decision about the business through mathematical approach.

Learning outcomes

After reading this chapter student can able to understand

1. Identify situations in which linear programming techniques can be applied, guidelines on linear programming model formulation, solve an LP problem by the graphical method, interpret the solution of an LP mode, understand the meaning of the word Simplex and logic of using simplex method, converting an LP problem into its standard form by adding slack, surplus, and/or artificial variables, recognize the special cases such as degeneracy, ,multiple optimal solutions, unbounded and infeasible solutions. Formulate the dual LP problem and understand the relationship between primal and dual solutions.

2. Recognize and formulate a transportation problem, drive initial feasible solutions using several methods, optimal solution by using MODI method, handle the problem of degenerate and unbalanced transportation problem. Understand the features of Assignment problem, formulate an assignment problem as a square matrix, apply the Hungarian method to solve an assignment problem, make appropriate changes to solve unbalanced assignment problem, profit maximization assignment problem, and solve a travelling salesmen problem.

2. Understand how optimal strategies, are formulated in conflict and competitive environment, principles of two-person zero-sum games, use dominance rules to reduce the size of a game payoff matrix and compute value of the game, apply minimax and maximin principle to compute the value of the game where there is a saddle point, make distinction between pure and mixed strategies.

3. Understand the steps of decision making process, make decision under various decision-making environments, determine the expected monetary value, expected opportunity loss, and construct decision trees for making decisions.

UNIT-I **- 12 Hrs**

Linear Programming: Introduction to Linear programming – formulation of LPP – solution of LPP - Using Graphical Methods, the Simplex Method; Justification, interpretation of Significance of All Elements In the Simplex Tableau, the Simplex Solution to A Minimizing Problem - Two-Phase and Big-M method - Definition of the Dual Problem, Primal, Dual Relationships.

UNIT-II **- 12 Hrs**

Transportation, Assignment Problems: Definition and Application of the Transportation Model, Solution of the Transportation Problem, the Assignment Model, and Travelling Salesman Problem.

UNIT-III **- 12 Hrs**

Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods, Graphical Solution of 2 x n and m x 2 games.

UNIT-IV **- 12 Hrs**

P.E.R.T. & C.P.M.: Definitions, various terms used in networking, Drawing networks – identifying critical path – probability of completing the project within given time.

UNIT-V **- 12 Hrs**

Decision Theory: Steps In the Decision Making, the Different environments, In which Decisions Are Made, Criteria For Decision Making Under Uncertainty, Decision Making Under conditions of Risk - Decision Trees, Graphic Displays of the Decision Making Process, Decision Making With an Active Opponent.

Skill Development:

(*These activities are only indicative, the Faculty member can innovate*)

1. Supply chain applications.
2. Job assignment.
3. Drawing network diagram for a project and identify the critical path.
4. Computation of earliest expected time and latest allowable time for events in a project.

Text Books:

1. J.K.Sharma, “Operations Research: Theory & Applications”, Macmillan India, 2007.
2. S.D.Sharma, “Operations Research”, 11th ed., Kendarnath, Ramanath & Co.

Reference Books:

1. Barry Render, Ralph M.Stair,Jr. Michael E.Hanna, “Quantitative Analysis for Management”, 9/e, PHI Pvt. Ltd , New Delhi, 2007.
2. Hamdy, A.Taha, “Operations Research: An Introduction”, Prentice-Hall of India, New Delhi, 2007.
3. Harvey M. Wagner, “Principles Of Operations Research”, PHI, New Delhi, 2003.
4. Pannerselvam.R, “Operations Research”, 2nd ed., PHI.
5. Operations Research, Kranthi Swaroop, P.K.Gupta and Manmohan, 4th ed., Sultan & Sons.